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PETROLEUM PRODUCTS AND USED OILS - DETERMINATION OF PCBS AND RELATED PRODUCTS - PART 2: CALCULATION OF POLYCHLORINATED BIPHENYL (PCB) CONTENT

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English version

Petroleum products and used oils - Determination of PCBs and related products - Part 2: Calculation of polychlorinated biphenyl (PCB) content

Produits pétroliers et huiles usagées - Détermination des PCB et produits connexes - Partie 2: Calcul de la teneur en polychlorobiphényles (PCB)

Mineralölerzeugnisse und Gebrauchtöle - Bestimmung von PCBs und verwandten Produkten - Teil 2: Berechnung des Gehalts an polychlorierten Biphenylen (PCB)

This European Standard was approved by CEN on 9 June 2001.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 19 "Petroleum products, lubricants and related products", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2002, and conflicting national standards shall be withdrawn at the latest by January 2002.

In this standard Annex A and B are normative.

This standard includes a Bibliography.

This European standard is one of a series of standards as listed below.

EN 12766, Petroleum products and used oils - Determination of PCBs[1)] and related products

Part 1: Separation and determination of selected PCB congeners by gas chromatography (GC) using an electron capture detector (ECD)

Part 2: Calculation of polychlorinated biphenyl (PCB) content

Part 3: Determination and calculation of PCB related products[2)]

[1)] PCBs as defined in:
Council directive 96/59/EC of 1996-09-16 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls. The definition includes PCBs proper, PCTs and also PCBTs (polychlorinated benzyltoluenes), tradename "Ugilec".

[2)] Part 3 of EN 12766 is under development

1 Scope

This standard specifies two calculation procedures ("method A" and "method B") for PCB content. The basis for this quantification is taken from the chromatographic results of EN 12766-1:2000 in which all necessary experimental procedures are described for the specific analysis of unused, used and treated (e.g. dechlorinated) petroleum products including synthetic lubricating oils and mixtures of vegetable oils. The method is also applicable to petroleum products and synthetic lubricating oils suitably recovered from other materials, e.g. from waste materials. Both methods have different strengths and weaknesses which are described in the next paragraphs and which must be considered before use in a specific application. Proper application of either method A or method B needs to be carefully considered before use in a specific application.

Using method A, special care needs to be exercised to avoid interferences from non PCB substances which may occur in the chromatogram. Therefore, method A can be used predominantly for the analysis of used and unused insulating oils. It is recommended not to use calculation method A without special precautions for other than above-mentioned products. Calculation method A can produce two alternative sets of results, ("All Probables" and "All Possibles"). Therefore, care needs to be taken in order to interpret these results in the correct manner.

Method B uses as intermediate result the sum of six congeners, which belong to the most abundant in almost all technical PCB materials, thereby minimizing potential interferences from other (coeluting) non PCB substances. To obtain the PCB content, the intermediate sum from six congeners needs to be multiplied by a multiplication factor. Calculation Method B can be used predominantly for the analysis of liquids from used and waste materials of unknown origin and for samples with low PCB contents.

2 Normative References

This European Standard incorporates, by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12766-1:2000, *Petroleum products and used oils - Determination of PCBs and related products - Part 1: Separation and determination of selected PCB congeners by gas chromatography (GC) using an electron capture detector (ECD)*

EN 61619, *Insulating liquids - Contamination by polychlorinated biphenyls (PCBs) - Method of determination by capillary column gas chromatography (IEC 61619:1997)*

EN ISO 4259, *Petroleum products - Determination and application of precision data in relation to methods of test (ISO 4259:1992/Cor 1:1993)*

3 Terms and definitions

As defined in several regulations and legislation e.g. Directive 96/59/EC, the term "PCB" includes "PCT" and also "PCBT". For the purposes of this European Standard, however, "PCB" is defined on a molecular, chemical basis and its measurement and quantification is described in EN 12766-1:2000 and EN 12766-2. Also, the terms "PCT" and "PCBT" are defined in chemical terms, and prEN 12766-3 describes their measurement and quantification.

For analytical results to comply with the mentioned legislation, the total of PCB from EN 12766-2 and PCT plus PCBT from prEN 12766-3 shall be added.

For the purposes of this part of the standard, the following terms and definitions apply.

3.1
polychlorinated biphenyl (PCB)
a biphenyl substituted with one to 10 chlorine atoms

NOTE For legal purposes, congeners with one, two or ten chlorine atoms may be excluded from this definition.

3.2
congener
any chlorine derivative of biphenyl, irrespective of the number of chlorine atoms

NOTE There are 209 possible congeners. These are listed in Annex C of EN 12766-1:2000. The congener numbers (IUPAC) are for easy identification; they do not represent the order of chromatographic elution.

3.3
DCB
abbreviation for PCB congener 209, decachlorobiphenyl, used as reference and as an internal standard

4 Calculation methods

The results from method A and method B shall not be confused.

4.1 Method A

This calculation procedure is based on EN 61619.

The gas chromatography used for method A is identical to EN 61619 and to EN 12766-1:2000. The calibration standards and test mixtures are also the same.

Method A uses the sum of the contribution of all congeners to produce a measurement for PCB content. Lack of chromatographic resolution means that it is not possible to resolve the peaks for all congeners, so that some overlapping can occur.

For the calculation of PCB content, the EN 61619 method uses two tables of response factors produced from the literature values (see Bibliography) by taking into account the relative proportions of coeluting congeners in each peak.

Not all congeners are calibrated. Nine congeners are taken across the range of elution times providing nine calibration windows. Within each window, the calibration factor is extrapolated to adjust, for each congener, the response factor from the literature.